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Date: October 1, 2009

0-05-106 - 15524/US/02

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor: Joshi et al.  
Serial no.: 10/541,011  
I.A. Filed: December 29, 2003  
Title: ENHANCED GENERATION OF HYDROXYL RADICALS  
Examiner: Edna Wong  
Art Unit: 1795  
Confirmation: 9060

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir/Madam:

**Response**

This response is in reply to the office action mailed on May 4, 2009. Applicant also submits a petition for two months (large entity) and the appropriate fees. Included in this response is a Declaration under 37 C.F.R. § 1.132 of Prof. Dan Meyerstein, who is presently president of the Ariel University Center of Samaria, and the Irene Evens Professor of Inorganic Chemistry in the Ben-Gurion University, Israel. Prof. Meyerstein, former president of the Israeli Chemical Society, is an expert on radical and catalytic chemistry, with special experience in Fenton reactions.

**Amendments**

1. Please amend claim 1 as shown in the enclosed document. The amendment restricts the method to a preferred pH range, originally claimed in claim 10, which is supported in all examples. The amendment also corrects the wording relating to the definition of amount of radicals.
2. Additional corrections in claims 1 and 8 relate to the Examiner's rejections under §112.
3. Claims 9 and 10 have been canceled.

**Claim Rejections – 35 USC §103**

4. The Examiner rejects claims 1, 4-6 and 8-16 as being unpatentable over CS 274995 (CS/995) in combination with US 6,793,903 (Parrish) and Jen et al., *J. of Chrom. A*, Vol. 796:283-288 (1998). The Applicant respectfully traverses the Examiner's rejections, as explained below.
5. The Examiner states, on page 3, the 3<sup>rd</sup> paragraph, that the test of obviousness is neither compatibility of two cited patent documents, nor the relevance of any one of the cited documents, but that the test is **what the combined teachings would have suggested to those skilled in the art**. After ushering the above opinion, the Examiner explains what Parrish teaches, but without providing what CS/995 teaches. Nevertheless, the applicant fully agrees with the Examiner in her analysis in

regard to Parrish: he teaches heat decomposition of the peroxide, regardless of whether the surface has a catalytic coating, but when using a catalyst – iron oxide is preferred. CS/995 (as already reviewed by the Examiner in her previous letters) teaches a decomposition catalyzed by either of iron, nickel, and copper ions. **The combined teaching of Parrish and CS/995 would suggest to the skilled in the art to use iron**, since the two cited documents have nothing else in common than Fe. The Examiner opined, on page 4, that a person skilled in the art would select MgO, but we hope that she will reconsider her opinion, particularly in view of the presented Declaration.

6. The Examiner believed that Fe(II), Cu(II), and MgO are functionally equivalent catalysts (page 4, line 7). The enclosed Declaration of an expert on radical chemistry and Fenton reaction explains that magnesium and iron would never be considered by a person skilled in the art as equivalent because magnesium is not a transition element, and because transition and non-transition elements have different electronic structures (paragraph 5 of the declaration).

7. In view of the above explanation, and of the Expert's declaration is believed that the above rejection is moot.

#### Claim Rejections – 35 USC §112

8. Claims 1 and 8 have been amended to address the Examiner's rejections, which rejections are believed to be moot.

#### Interview with the Supervisory Patent Examiner

9. The Supervising Primary Examiner ("SPE") kindly provided a telephonic interview to the applicant's representative on 4 May 2009, in which he opined that a thermal reaction using MgO as a catalyst in generating hydroxyl radicals may actually be a photoreaction, since UV is supposedly present during most thermal reactions. The SPE indicated that if the applicant could provide some evidence that the catalytic MgO used to generate hydroxyl radicals operates differently in a thermal reaction from a photoreaction using UV then the Examiners would be receptive to such evidence as a basis to overcome the cited references.

The SPE through the examiner further issued an Office Communication on 5 May 2009, summarizing the interview. The Summary recites the applicant's argument that substituting MgO catalyst from the secondary reference into the primary reference is not obvious, as one reaction is thermal catalytic and the other photocatalytic. The SPE relates to possible counter arguments stating that both catalytic reactions produce the same hydroxyl radicals, and that UV light is possibly presented in the thermal catalytic process of the secondary reference since UV is present in the sun light. The SPE promises that the arguments will be reconsidered.

It is respectfully submitted that the radicals in both reactions are different, because in the considered heat reaction all the products are in **gas phase**, wherein in the considered photoreaction the components are in **liquid phase** – including the radicals. As for the question of UV, the Examiner's kind attention is directed to the enclosed Declaration, in which an expert on radicals and catalysis relates to the issue. The SPE might be correct in regard to very high temperatures, but as for the temperature range used in the cited document, **no UV is formed between 200 and 500°C**. The Examiner's attention is particularly directed to paragraph 4 of the Declaration.

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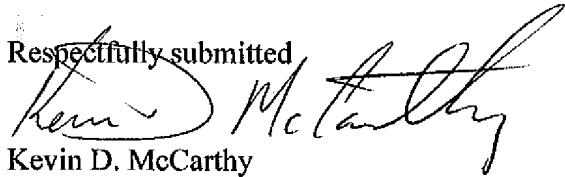
Conclusion

10. In his Declaration, the expert on radical and catalytic reactions states that he would not expect any UV to be present in the Parrish reaction (paragraph 4); the Expert states that an inorganic chemist would not expect that magnesium oxide could replace a transition metal in a catalytic process (paragraph 5); the Expert believes that the processes described in Parrish and in CS/995 are different from each other and also from the reaction of the present invention (paragraph 6); finally, the Expert thinks that the effect of magnesium oxide in the present invention to be surprising.

In view of the amendments which distinguish the present reaction still more from the published techniques, and in view of the above explanations, and mainly in view of the enclosed Declaration, the Applicant believes that the invention, as described in the amended claims, is novel and non-obvious over the cited publications.

Applicant appreciates both Examiners for their careful attention to the present case, the applicants respectfully ask for favorable reconsideration and allowance of the claims, as all raised objections and rejections have been duly addressed.

Respectfully submitted



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